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ON PAGE 1

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Pressures Are Increasing For Arms Race in Space

By PHILIP M. BOFFEY
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WASHINGTON, Oct. 17 — Edward Teller, the nuclear physicist widely credited with inventing the hydrogen bomb, visited President Reagan at the White House recently to give him an idea for another revolutionary weapon.

The device might be stationed in space or launched into space at a moment's notice. Its core would be a small nuclear bomb and its power would be delivered by lasers.

If the Soviet Union ever launched a mass missile attack against the United States, tracking instruments would point the lasers at the missiles, the nuclear bomb would explode, the radiation generated by the bomb would activate the lasers, and lethal light beams would flash toward the earth. Instantaneously, these beams would destroy vast numbers of the missiles in flight.

Buildup in Space

A New Military Focus

Second of three articles.

Many Uses of Satellites

Space technology scientists are not certain whether such a weapon could actually be made to work. But the fact that its possibilities are being discussed seriously by one of Mr. Reagan's most eminent scientific advisers illustrates the pressures that are building for an arms race in space.

Satellites are used for such military support activities as communications, reconnaissance, early warning of attack, navigation, weather forecasting and monitoring of arms control agreements. Elaborate, highly sophisticated refinements of these devices are being developed by the Defense Department. Now the emphasis is shifting from support activities to weapons; momentum is gathering in the Soviet Union and the United States.

Indeed, there are already these major weapons developments:

¶The Soviet Union has an antisatellite weapon that could be fired into orbit and maneuvered close to its target and the United States is rapidly developing an even better satellite-killer. Both are effective only against low-orbiting targets in space.

¶Each superpower has weapons that could disable satellites. Each could simply fire a nuclear warhead into space, then explode it, unleashing an "electromagnetic pulse" that would indiscriminately damage the sensitive electronics of unprotected satellites, both friend and foe.

¶The Soviet Union has an orbital bombing system that could rain nuclear warheads on the United States from space. American military strategists see no advantage in matching this system, however, saying their own nuclear warhead delivery ability is superior.

¶Both are trying to develop laser weapons to disable satellites, aircraft or missiles. Some analysts estimate that the Russians may send a crude laser weapon into orbit in one to five years.

¶Both are studying more exotic weapons, such as particle beams generated by atomic accelerators in orbit; these are not expected to prove feasible in this century, if at all.

Criticism of Arms Race

The movement toward greater militarization of space is not free of criticism. At a Congressional hearing in late September, John Steinbruner, director of defense studies at the Brookings Institution, a research organization, warned that the superpowers were "in the early stages" of an arms race in space that might produce "decades of virulent destructive competition."

Military scientists in the Reagan Administration and outside experts say they do not believe that any of the advanced space weapons could be sufficiently developed in the next decade or two to give either side a decisive advantage. However, Administration officials insist that the United States has no choice but to continue a vigorous weapons development program to counter what the officials consider an alarming rate of space-related military development in the Soviet Union.

The most likely immediate use of space for weaponry would be an increase in satellites directing tactical weapons on earth. The Soviet Union has radar surveillance satellites in low orbit that can track American surface ships virtually anywhere. If a conflict broke out, they would be used to guide bombers, missiles and submarines.

Tactical and Strategic Aims

American officials also plan to use satellites in a tactical role, according to Robert S. Cooper, director of the Defense Advanced Research Projects Agency. And strategically, navigation satellites are poised to help submarines get a precise fix before launching nuclear missiles. A satellite system in the works will record nuclear explosions, allowing American commanders to know which targets have been hit.

Such advances by both sides raise the incentive to knock enemy targeting satellites out of action before they can guide a nuclear strike. In the 1960's, the United States actually had an antisatellite system, called ASAT, using nuclear warheads launched by rockets, but it was dismantled in 1975.

The Soviet Union pushed ahead, however, and developed an antisatellite system that has been termed "operational" by the Defense Department. It is a satellite that can be launched into orbit and maneuvered close enough to a target to explode and destroy it with shrapnel. The highest altitude attained was about 1,400 miles, enough to reach some American reconnaissance, navigation and weather satellites, but far too low to reach the most crucial early warning, communications and navigation satellites.

The United States is racing to catch up with an advanced ASAT: a miniature homing vehicle to be carried high in the atmosphere by an F-15 fighter, then boosted farther into space by a two-stage rocket. It would use infrared sensors to home in and explode near the target.

Although the air-launched ASAT has been tested less than the Soviet Union's ground-launched version, it is considered more capable because the planes can be sent virtually anywhere. A prime target would be the Soviet ocean-surveillance satellites that threaten American surface vessels. The Pentagon has directed that the first antisatellite systems be ready for use by 1987.

Neither antisatellite system will initially be able to reach satellites in geosynchronous orbit, at 22,300 miles out, where the satellite is traveling at precisely the same speed as the earth's

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rotation and thus remains over the same point on the ground.

Perhaps the most effective weapon against the current generation of satellites is in hand; it is an ordinary nuclear warhead that can be exploded in space. Such an explosion generates an electromagnetic pulse damaging e or destroying unprotected electronics circuits at enormous distances.

The Congressional Research Service has asserted that "a single nuclear warhead could conceivably disable all satellites," even those in geosynchronous orbit, except those protected by the earth's shadow. But Harry A. Griffith, director of the Defense Nuclear Agency, calls such claims "inaccurate."

'Cheap Shot' Is a Concern

"You cannot protect any satellite from a determined attacker," Dr. Gordon Soper of the agency said, "but you can protect against the cheap shot," like a single electromagnetic pulse, that would wipe them all out at once. Hardening technology has already been incorporated in some communications satellites, and more will be hardened.

The Defense Department's largest exploratory development program is aimed at developing laser weapons, devices that use a concentrated beam of radiant energy to weaken the surface of a target, disable key components or ignite fuel and explosives.

The budget for military lasers has jumped sharply in recent years, from just above $200 million in the fiscal years 1980 and 1981, to an anticipated $400 million or more in the fiscal year 1983, which began Oct. 1.

The earliest potential space application of lasers, conceivable in the next five to 10 years, would be to attack enemy satellites or to defend friendly satellites, either from a platform in space or from the ground.

Question of Vulnerability

But many military analyists question the significance of such a weapon. They say it could only threaten satellites in low orbit, would probably be less effective than the more conventional antisatellite system under development in this country, and would be vulnerable to attack by weapons that are less costly and less difficult to launch.

Michael M. May, associate director of the Lawrence Livermore Laboratory, a weapons facility, deems it "quite unlikely" that a laser space station could survive an attack by, say, 20 nearly undetectable ASAT's such as those the United States is developing.

The most ambitious role envisaged for space lasers is as a near-perfect defense against Soviet ballistic missiles. Senator Malcolm Wallop, Republican of Wyoming, has championed the idea of developing and orbiting several dozen laser stations that could blanket the earth and shoot down Soviet missiles shortly after takeoff. The Senate this year actually passed legislation calling for an orbital demonstration of a laser weapon within the decade.

However, virtually all the top scientists that have studied lasers for the Pentagon or the White House say they consider the prospects for an all-encompassing laser missile defense remote.

Peter Franken, a laser expert at the University of Tuscon and a consultant to the Pentagon, jokes that a laser battle station might cause more damage if it was dropped from space than if it aimed its laser beams earthward. Dr. Cooper, of the Defense Advanced Research Projects Agency, says that the "odds are very low," perhaps 10 to 20 percent, that laser weapons could be "a stunning success" in the near future.

Technical Hurdles Remain

There are formidable technical challenges in developing all major components of the system, says Dr. Cooper. There is "the central issue," he says, of putting the whole system of laser stations together so that it could destroy a thousand or more Soviet missiles in a matter of minutes.

Harold Brown, the most technically informed Defense Secretary in recent years, has written that a laser could be placed aboard a satellite to defend the satellite itself in five years. But a system of space-based lasers for missile defense "would probably not be feasible before the next century, if ever," he said, "and would cost on the order of $100 billion."

"Headlong rushes to develop a system will ultimately compromise our prospects for the future," warns George A. Keyworth 2d, the President's science adviser, an advocate of further scientific studies but not of crash deployment.

Particle-beam weapons are at a far more rudimentary stage than lasers. Such a weapon would use streams of charged or neutral atomic or subatomic particles to bore into the target, causing structural damage, disrupting electronics and detonating fuel or explosives. Like the laser, it could reach its target at the speed of light.

Mark Burton, a particle beam expert and Defense Department consultant, said in a lecture at the Brookhaven National Laboratory on Long Island that the particle-beam weapon is "a long shot — it may not come to anything."

Recognizing the uncertainties about lasers and particle beams, a study sponsored by the conservative Heritage Foundation urged in March that "off-the-shelf components" be used to build a more conventional ballistic missile defense system in space in five or six years. The study, High Frontier, was headed by retired Lieut. Gen. Daniel O. Graham of the Air Force, a former military intelligence chief. The study recommended a network of 432 satellites that would try to shoot down Soviet missiles with heat-seeking rockets carrying conventional warheads.

Alternative System Criticized

The proposal has excited little enthusiasm in the nation's capital. Richard D. DeLauer, Under Secretary of Defense for research and engineering, contends that the study "grossly underestimated" the time and money needed. Moreover, he said, the system would pose roughly the same management complexities as the more exotic space defense systems and be roughly as vulnerable to attack and decoys.

Military officials emphasize that all the space weapons being developed or studied are primarily defensive in nature. Even if laser or particle beams were used offensively, to knock down a satellite, they say, the effects would be surgically precise, for these are not weapons of mass destruction.

The only significant mass-destruction weapon is the extensively tested Soviet orbital nuclear bomb, which is designed to be shot into space, then brought down near its target. But try as they may, American military planners can find no value in space bombs when thousands of nuclear missiles are already poised for Armageddon on the earth. "No one can find any advantage to putting nuclear weapons in space," Dr. Cooper says.